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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,246	10/20/2003	James Scaba	3994994-131917	3823

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EXAMINER

HANDAL, KAITI V

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/689,246	SEABA ET AL.	
	Examiner	Art Unit	
	Kaity Handal	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 13-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In this instance, the limitation "micro channels" is neither described in the specification nor illustrated in the figures.

4. Claim 13-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the same module" in line 10". There is insufficient antecedent basis for this limitation in the claim.

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Claims 17, 20, 32 recite the limitation "a plurality of micro channels" being on the first side of the module and a second fluid flow is introduced into a plurality of micro channels formed adjacent to the sides of the micro channels of the first side. It is unclear where the second fluid flow is introduced exactly. Claims language renders claims unclear.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 13-16, 18-22, 24, and 26-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich et al. (WO 99/00186), and further in view of Cleveland (US 3,943,994).

Regarding claims 13-16, 26-28, 31-32 and 35, Tonkovich et al. discloses a system for producing syn-gas enriched with hydrogen comprising: a mixer for producing a feedstock of vaporized hydrocarbons and water vapor (P2/L1-5); a steam reformer (410) into which feedstock is directed (P9/L31-35); a combustor/vaporizer (404) for generating heat energy from fuel cell (402) off gas (400) and vaporized hydrocarbons to heat the steam reformer (410) (P9/L19-35); an exit from the steam reformer (410) for the syn-gas produced therein (Fig. 4);

including means for providing in at least one of the stages in the system a laminar flow of fluid to effect an energy exchange between fluids (P1/L8-13).

Tonkovich teaches wherein said system comprises a steam reformer/methanizer (fig. 2d, 230) (page 8, lines 19-22) and a combustor/exothermic chamber (100) (page 7, lines 20-23) being enclosed within the same module as illustrated in (fig. 2d) and wherein exists a heat exchanger (114) having microchannels (page 6, lines 11-12). Tonkovich fails to show wherein said reformer/methanizer and combustor/exothermic chamber are comprised of a plurality of micro channels as well. Cleveland teaches a corrugated heat exchanger (fig. 1), which forms a plurality of channels as illustrated, coated with a suitable catalyst in order to improve the efficiency of the system (col. 1, lines 19-25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made apply a suitable catalyst to the microchannels of Tonkovich, as taught by Cleveland, in order to improve the efficiency of the system.

Regarding claim 24, Tonkovich et al. discloses all of the claim limitations as set forth above, additionally the reference disclose the system: wherein a heat exchanger directs fluids between which heat is exchanged into adjacent laminar flows (P1/L8-13); wherein the means for providing laminar flow includes a catalytically active surface in contact with fluid flow (P9/L15- 16); said system in operative combination with a fuel cell (402); including a start module comprising a heat exchanger with adjacent sections for laminar flow in which hydrogen from an external source is combusted to provide heat energy in one section and hydrocarbon

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fluids are vaporized in an adjacent section to imitate the vaporization of fluids and steam reforming in the system (P1/L8-13, P9/L19-35); in which the laminar flow unit is a micro channel having a width to depth aspect ratio of from about 1: 10 to about 1 : 100 (P 1+8-13).

Regarding claims 18-20, Tonkovich teaches wherein apparatus includes a vaporizer (fig. 4, 404), a fuel reformer (410) which contains a water gas shift reactor and partial oxidation reactor, whereby gas predominantly comprised of hydrogen is introduced into the fuel cell (402) (P9/L35-P 10/L2).

Regarding claims 21-22, 33, while Tonkovich does not explicitly disclose one or more storage tanks for separately storing at least one of fuel cell off gas, a liquid hydrocarbon composition and water, said tanks are inherent in disclosed system.

Regarding claims 30, 34, Tonkovich teaches wherein apparatus includes a fuel cell (fig. 4, 402), and a preferential oxidation reactor in line intermediate a fuel reformer (410) and the fuel cell (402) (P9/L35-P 10/L2).

Regarding limitations recited in claims 20, 24, 29, 36 which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

7. Claims 17-20 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich et al. (WO 99/00186), in view of Cleveland (US 3,943,994), as applied to claim 13 above, and further in view of Bonville et al. (WO 99/67018).

Regarding claim 17, Tonkovich et al. discloses all of the claim limitations as set forth above. Additionally the reference discloses system including a water gas shift reactor and a preferential oxidation reactor, whereby gas predominantly comprised of hydrogen is introduced into the fuel cell (P9/L35-P 10/L2), but the reference does not explicitly disclose a second heat exchanger for cooling the gas from the steam reformer. Bonville et al. teaches a system for producing syn-gas enriched with hydrogen comprising at least one second heat exchanger for cooling the gas from the steam reformer (P8/L20-P9/L7). Said heat exchangers are necessary to bring the reformed gas to the temperature required by shift reactor, additionally the heat of said reformed gas is used to heat other streams in the system.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to pass a reformed gas of Tonkovich et al. into a cooling heat exchanger, as taught by Bonville et al., before passing said reformed gas into a shift converter, for the purpose of improving heat efficiency of the system by bringing said reformed gas to the temperature required by shift reactor, by using energy of said reformed gas heat other streams in the system.

Tonkovich teaches wherein said system comprises a steam reformer/methanizer (fig. 2d, 230) (page 8, lines 19-22) and a combustor/exothermic chamber (100) (page 7, lines 20-23) being enclosed within the same module as illustrated in (fig.

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2d) and wherein exists a heat exchanger (114) having microchannels (page 6, lines 11-12). Tonkovich fails to show wherein said reformer/methanizer and combustor/exothermic chamber are comprised of a plurality of micro channels as well. Cleveland teaches a corrugated heat exchanger (fig. 1), which forms a plurality of channels as illustrated, coated with a suitable catalyst in order to improve the efficiency of the system (col. 1, lines 19-25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made apply a suitable catalyst to the microchannels of Tonkovich, as taught by Cleveland, in order to improve the efficiency of the system.

Claims 18-20 are rejected for the same reasons as presented in paragraph 6 above.

Regarding claim 25 Tonkovich et al. discloses all of the claim limitations as set forth above, additionally the reference disclose the system: wherein a heat exchanger directs fluids between which heat is exchanged into adjacent laminar flows (P1/L8-13); wherein the means for providing laminar flow includes a catalytically active surface in contact with fluid flow (P9/L15-16); said system in operative combination with a fuel cell (402); including a start module comprising a heat exchanger with adjacent sections for laminar flow in which hydrogen from an external source is combusted to provide heat energy in one section and hydrocarbon fluids are vaporized in an adjacent section to imitate the vaporization of fluids and steam reforming in the system (P1/L8-13, P9/L19-35); in which the laminar flow unit



is a micro channel having a width to depth aspect ratio of from about 1: 10 to about 1 : 100 (P 1+8-13).

Regarding limitations recited in claims 17 and 25 which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

8. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich et al. (WO 99/00186), in view of Cleveland (US 3,943,994), and in view of Bonville et al. (WO 99/67018), as applied to claim 17 above, and further in view of Dixon (USP 3,929,430).

Regarding claim 23, Tonkovich et al as modified discloses all of the claim limitations as set forth above. Additionally the reference discloses various fuels, including gasoline, which can be used for production of hydrogen in the reformer (P5/L8-10), but the reference does not explicitly disclose said system including an in-line zeolite cracker. Dixon teaches that various hydrocarbon fluids can be cracked in an in-line zeolite cracker to produce gasoline, which then can be used in a reformer to produce synthesis gas (C4/L6-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an in-line zeolite cracker in the modified system of Tonkovich et al., as taught by Dixon, for the purpose of adapting the modified system of Tonkovich et al. to use various fuels. This way systems flexibility is increased, which usually offers economical advantage over more limited systems.

### ***Double Patenting***

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 13-16, 18, 20, 24-28, 31-32, and 35-36 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 6,716,400.

Although the conflicting claims are not identical, they are not patentably distinct from each other because said claims 13-18, 20, 24-28, 31-32, and 35-36 of the instant application recite only the limitations which are recited in claims 1-25 of U.S. Patent No. 6,716,400.

11. Claims 17 and 21-22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 6,716,400 in view of Bonville et al. (WO 99/67018).

Regarding claim 17, claims 1-25 of U.S. Patent No. 6,716,400 recites all of the instant claim limitations as set forth above, but they do not recite any purification steps for the reformed gas before said gas can be introduced into the fuel cell.

Bonville et al. teaches a system including reforming, for producing syn-gas enriched with hydrogen for fuel cell, said system comprising at least one second heat exchanger for cooling the gas from the steam reformer, a water gas shift reactor and a preferential oxidation reactor, whereby gas predominantly comprised of hydrogen is introduced into the fuel cell (P8/L18-P10/L10). It would have been obvious to one having ordinary skill in the art at the time the invention was made to pass a reformed gas of claims 1-25 of U.S. Patent No. 6,716,400 into the purifying system of Bonville et al., before passing said reformed gas into a fuel cell, for the purpose of protecting said fuel cell from carbon monoxide.

Regarding claims 21-22, claims 1-25 of U.S. Patent No. 6,716,400 in view of Bonville et al. discloses all of the claim limitations as set forth above. Additionally, while

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the references do not explicitly disclose one or more storage tanks for separately storing at least one of fuel cell off gas, a liquid hydrocarbon composition and water, said tanks are inherent in disclosed system.

12. Claim 23 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 6,716,400 in view of Dixon (USP 3,929,430).

Regarding claim 23, claims 1-25 of U.S. Patent No. 6,716,400 recite all of the claim limitations as set forth above, but they do not recite said system including an in-line zeolite cracker. With respect to Dixon the same comments apply as set forth above.

### ***Response to Arguments***

#### **Specification**

Objections to specification are withdrawn due to amendments to the specification.

#### **Drawings**

Objections to the drawings are withdrawn due to applicant's amendments to the specification and figures.

#### **Claims**

Objections to the claims are withdrawn due to applicant's amendments to the claims.

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Claim Rejections

Applicant's arguments filed 12/29/2005 have been fully considered but they are not persuasive. Applicants argue that Tonkovich et al. does not disclose a system having a combustor interconnected to receive fuel cell off gas to heat a steam reformer.

Examiner respectfully disagrees as Tonkovich et al. teaches wherein a fuel reformer (410) containing a combustor/partial oxidation reactor (page 9, line 35 – page 10, lines 1-2) which would be fluidly interconnected to receive fuel cell off gas to heat a steam reformer.

Applicants argue that neither Tonkovich et al. nor Bonville et al. suggest having storage tanks. The examiner holds, as discussed in the rejection above, that having storage tanks is inherent in the disclosed system.

Double Patenting

Applicant argues that Patent 6,716,400 does not duplicate nor renders obvious with other references the specified configurations of the apparatus as claimed in claims 13-16. Examiner respectfully disagrees as set forth above in the Double Patenting rejection.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH 

3/14/2006

  
ALEXA DOROSHENK NECKEL  
PRIMARY EXAMINER